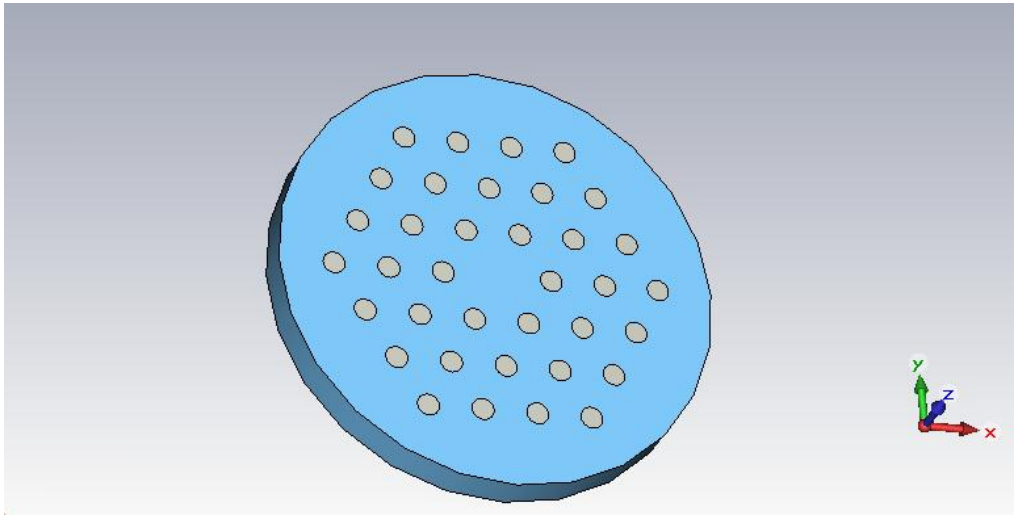
Final project

Novel High-Gradient Accelerating Structures

USPAS, Summer 2010

PBG, standing wave structures

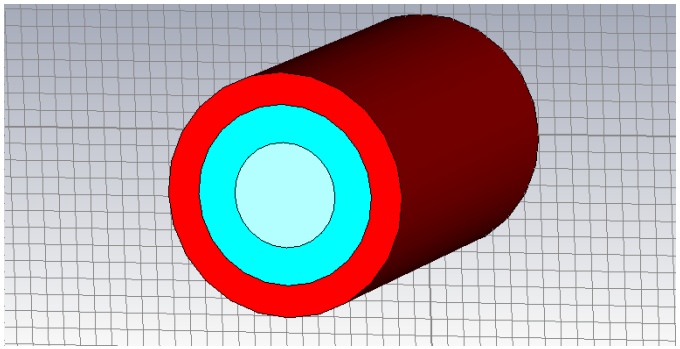
Assume lattice:



Rod radius = 2 mm
Periodicity = 10 mm
Rod height = 7 mm
Vacuum box radius = 40mm
Vacuum box height = 7 mm

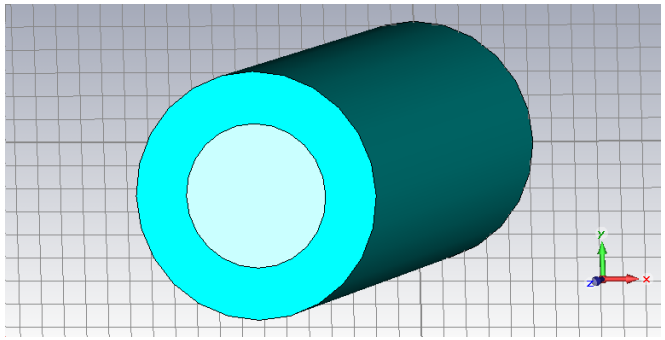
1. Simulate TM010– like and both TM110 – like modes. Use symmetry planes. Plot Ez
2. Adjust radius and periodicity to match 11.424 GHz resonance frequency. Use symmetry planes. Simulate both TM110 modes, use symmetry again.
3. Find accelerating parameters for TM010-like. Find Q-factor for both TM110 – like.
4. Find radius of pillbox with height=7mm to have TM010 mode at 11.424 GHz use optimizer and symmetry planes.
5. Find accelerating parameters for TM010. Find Q-factor for TM110 mode.
6. Compare accelerating parameters (put both structures in one table). Keep units!
7. Compare Q-factors from TM110 modes for the two cases.
8. Discuss results

DLA, travelling wave structures



ε_{red} = 9.7 (1e-4); ε_{blue}=37(3e-4)
R_{vacuum}=3mm; R_1=5.17mm; R_2=7mm

1. Adjust R2 to get TM02 mode to 11.424 GHz synchronized with the beam. Choose appropriate length of the structure for simulation
   *hint initially this mode is slightly below 12 GHz.
2. Calculate accelerating parameters.



ε_{blue}=37(3e-4)
R_{vacuum}= 3 mm; R_1=5 mm

1. Adjust R1 to get TM01 mode to 11.424 GHz synchronized with the beam. Choose appropriate length of the structure for simulation
2. Calculate accelerating parameters.

Combine results in a single table. Compare, discuss.